

Table 2

No.	Crystal grain diameter d (mm)	Number of punching (Ten thousand times)	Properties of steel sheet before aging		CYS (MPa)	Properties of steel sheet after aging		Change amount ΔYS (2) - (1)	Volume ratio (vcl%)	Cu precipitation state	Size (nm)	Remarks
			YS(1) (MPa)	W _{15/50} (1) (W/kg)		YS(2) (MPa)	W _{15/50} (2) (W/kg)					
1	0.10	83	385	2.7	520	420	2.7	35	0.0	0.02	9	Comparative example
2	0.10	81	365	2.5	520	520	2.6	155	0.1	0.20	6	Example
3	0.10	89	370	2.5	520	612	2.7	242	0.2	0.41	6	Example
4	0.10	92	370	2.5	520	620	2.7	250	0.2	1.20	15	Example
5	0.10	86	374	2.4	520	608	2.6	234	0.2	1.34	18	Example
6	0.10	80	370	2.3	520	522	2.6	152	0.3	1.40	20	Example
7	0.10	65	412	3.8	520	440	4.5	28	0.7	2.40	50	Comparative example
8	0.03	108	215	5.9	342	427	6.1	212	0.2	0.26	5	Example
9	0.10	65	550	2.0	710	850	2.2	300	0.2	1.34	18	Example
10	0.03	103	206	6.0	342	225	6.1	19	0.1	0.00	-	Comparative example
11	0.10	28	610	2.2	710	612	2.2	2	0.0	0.00	-	Comparative example
12	0.10	72	520	2.3	665	670	2.8	150	0.5	1.20	12	Example
13	0.10	69	470	2.0	623	670	2.3	200	0.3	1.10	12	Example
14	0.10	65	565	2.4	728	780	2.7	215	0.3	1.25	15	Example
15	0.10	85	495	2.2	644	680	2.6	185	0.4	0.90	7	Example
16	0.10	73	468	2.3	520	620	2.5	152	0.2	1.00	18	Example
17	0.10	69	450	2.3	520	615	2.5	165	0.2	1.10	15	Example
18	0.10	91	377	2.4	520	618	2.4	241	0.0	0.90	8	Example
19	0.10	93	360	2.4	520	621	2.5	261	0.1	0.85	7	Example
20	0.10	85	360	2.3	520	612	2.6	252	0.3	1.20	10	Example
21	0.10	80	365	2.5	520	615	2.6	250	0.1	0.80	7	Example
22	0.10	93	354	2.5	520	613	2.6	259	0.1	1.20	8	Example
23	0.10	85	370	2.5	520	605	2.6	235	0.1	1.40	9	Example
24	0.10	78	409	2.3	520	607	2.5	198	0.2	1.20	12	Example
25	0.10	98	355	3.1	520	570	3.3	215	0.2	0.60	8	Example
26	0.10	95	350	3.0	520	530	3.2	180	0.2	0.50	7	Example
27	0.10	82	362	3.1	520	555	3.4	193	0.3	0.65	8	Example